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REPORT

ON THE

Coals of Southeastern Ohio,

TRIBUTARY TO THE

Bellaire, Zanesville & Cincinnati Railway

AND

PROJECTED LINES,

BY

JAS. K. GEDDES,

M. Am. Soc. C. E.

ZANESVILLE, OHIO.

THE COURIER CO., PRINTERS, BINDERS AND PUBLISHERS.

1895.

VIRGINIA

LAKE MICHIGAN

MICHIGAN

LAKE ST. CLAIR

LAKE ERIE

CANADA

INDIANA

OHIO

KENTUCKY

PENNSYLVANIA

RAIL ROAD MAP

Showing the relation of the

COAL FIELD of SOUTHEASTERN OHIO

to the Markets of the North and West

to accompany a Report by

JAS. K. GEDDES C.E.

1895.

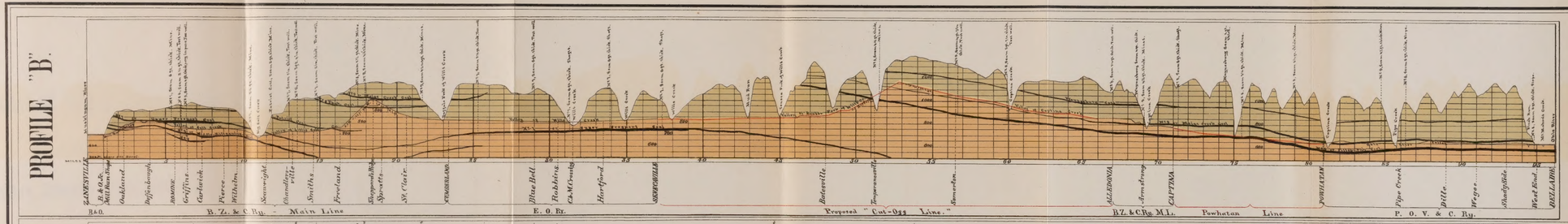
SCALE OF MILES

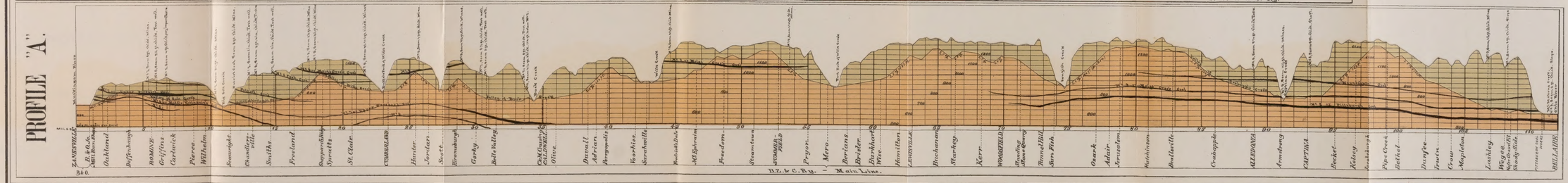
LEGEND.

RAILWAY LINES.

- Bellaire, Zanesville & Cincinnati
- Baltimore & Ohio
- Pennsylvania Lines
- Columbus, Sandusky & Hocking
- Cleveland, Akron & Columbus
- Cleveland, Canton & Southern
- Cleveland, Lorain & Wheeling
- Wheeling & Lake Erie
- Toledo & Ohio Central
- Columbus, Hocking Valley & Toledo
- Flint & Pere Marquette
- Toledo, Ann Arbor & North Michigan
- Michigan Central
- Grand Trunk of Canada
- Lake Shore & Michigan Southern
- Other Lines

Photo-Lith. by A. HOEN & CO., Balto., Md.





PROFILES
OF THE
B.Z.&C.RY.
WITH
Collateral Geological Sections
SHOWING COAL SEAMS.

to accompany a Report by
JAS. K. GEDDES C.E.
1895.

C.F. Martin Del.

Note.
Profile "A" shows the line as at present operated.
Profile "B" shows the proposed route via Cumberland, Senecaville, Alledonia, Captina, and Powhatan.

Photo-Lith. by A. HOEN & CO., Balto., Md.

LIBELLE B.
LIBELLE A.

REPORT

ON THE

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1895.

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LETTER OF TRANSMITTAL.

THE BELLAIRE, ZANESVILLE & CINCINNATI RY. CO.,

OFFICE OF THE GENERAL MANAGER.

ZANESVILLE, OHIO, August 1st, 1895.

COL. S. L. MOONEY, PRESIDENT:

DEAR SIR:—I beg leave to present you herewith a Report on the coal fields of Southeastern Ohio, tributary to the Bellaire, Zanesville & Cincinnati Railway and its projected lines.

In the preparation of the following pages, I have drawn upon all available sources of information. I am largely indebted to the voluminous reports of the Geological Survey of Ohio, more particularly the later volumes, prepared by Dr. Edward Orton, State Geologist. I have also made careful personal examination of the territory under consideration. I had put down under my direction a number of drill holes, with the diamond drill, in parts of the territory where the coal is below drainage. There have also been put down a number of drill holes by private individuals, as well as a number of oil wells, from the record of which more or less reliable information has been obtained. While further explorations are necessary to determine more definitely the extent of the coal seams throughout the regions under consideration, enough is already known to enable us to say with confidence that the

territory is one possessed of the greatest commercial value.

I have had prepared two maps to accompany the report. One is a sectional coal map of the territory under consideration, drawn to a scale of one-half inch to the mile. The other is a railway map showing the general relation of the Ohio coal field to the markets of the North and West; the subject being further illustrated by two plates, one showing the growth in the output of Ohio coals, and the other showing receipts and shipments of bituminous coal at some leading points. There is also a profile of the Bellaire, Zanesville & Cincinnati Railway, as well as one of the projected route, showing Collateral Geological Sections, that will aid in a material way in obtaining a clear idea as to the relation of the various seams. For a better understanding as to the structure of the seams, I have had prepared a number of plates, giving sections of the coal from various parts of the region, as well as some from points outside, for the purpose of comparison.

I am, Very Respectfully,

JAS. K. GEDDES,

General Manager.

I.

INTRODUCTION.

GENERAL DESCRIPTION.

The coal seams treated of in this report belong to the great Appalachian or Allegheny coal field, by far the most important of any on the American continent. The Ohio field occupies the western portion of the basin, covering a space in the eastern part of the state of more than 200 miles in length by some 80 or 90 in breadth at the widest part, with an area of 10,000 square miles. However, while the coal measures may occupy a territory covering 10,000 square miles, it must not be understood that productive seams are found throughout the whole extent, for over vast tracts of this area, no coal seams of any economic value were ever formed. In fact the districts where mining can be carried on in a large way are comparatively few and relatively small.

The carboniferous strata of Ohio may be divided into four groups as follows:

1st. The Lower Coal Measures,
or Allegheny River Series.

2nd. The Lower Barren Measures,
or Elk River Series.

3rd. The Upper Coal Measures,
or Monongahela River Series.

4th. The Upper Barren Measures,
or Permo Carboniferous Series.

While the thickness of the strata composing each of these four divisions varies greatly, we may in a general way say that each of the productive measures is about 250 feet thick and each of the barren measures 500 feet thick. Commonly all the groups thicken as we approach the Ohio river from the west.

The strata composing the coal measures of Ohio have a dip to the south and east, averaging perhaps 20 or 25 feet per mile. There are here and there a few gentle folds, enough distortion perhaps in a few localities to cause a reversal in the direction of the dip. There are but few faults in the strata and these are always very inconsiderable in extent. The great regularity of the dip, the moderate inclination of the strata and the few faults, all conspire in rendering to the whole field great facilities for carrying on mining operations.

Along the line of the Bella're, Zanesville & Cincinnati Railway and its projected lines, we have the upper part of the Lower Coal Measures, including the three principal seams, viz: The Lower and Middle Kittanning and the Upper Freeport coal, all of the Upper Coal Measures with its two principal seams, the Pittsburgh and the Meigs Creek coal; and both of the Barren Measures, which contain no seams of much commercial importance. On account of the dip, the lowest strata that are exposed at Zanesville are probably some 700 feet beneath the surface at Bellaire.

As indicated above, the available seams of coal along the road are five: the Lower Kittaning, the Middle Kittanning and the Upper Freeport, belonging to the Lower Coal Measures; the Pittsburgh and the

Meigs Creek belonging to the Upper Coal Measures. All these are regular and conformable, with no faults worthy the name.

While two of the seams may reach a better development in some other portions of the State, the coal along the road will compare very favorably in quality with any coals in Ohio.

It is true that the seams do not reach the abnormal thickness of those in some portions of the Hocking Valley field, but as is well known the difference in the cost of mining a seam 4 to 6 feet thick is commonly inconsiderable as compared with that of mining a seam having a thickness of 10 feet or more. Indeed as compared with the Hocking Valley field, the coal along the Bellaire, Zanesville & Cincinnati Railway and its projected lines can probably be mined more cheaply, owing to the fact that in the former field a very considerable portion of the seam is worthless coal that must be removed to secure the merchantable coal.

VARIETIES OF OHIO COALS.

All the seams in the carboniferous series of Ohio belong to the bituminous coals, there being no anthracite found within the State. These bituminous coals may be subdivided into three classes, the open burning coals, the cementing coals and the cannel coals.

The first class, the open burning coals, include such as do not cake or adhere to the furnace, and are adapted in the raw state for the manufacture of iron. These coals generally have a distinctly laminated structure, the bituminous layers being separated by thin partitions of cannel or mineral charcoal which do not coke.

The second class, or the cementing coals, when brought into the presence of heat, melt or agglutinate more or less. When used in a furnace, this property of melting or agglutinating causes them to choke up the furnace, thus shutting off the draft. This class of coals can not be used for iron making in a raw state, but must first be coked, burning off the volatile combustible matter. A given seam of coal may be more or less cementing in one district and open burning in another.

The third class, or the cannel coals, resemble a compact, highly bituminous shale. It is often found that a bituminous coal may pass into a cannel coal, which in turn may pass into a bituminous shale. The highly volatile character of the coal renders it valuable as a coal for the manufacture of gas. No considerable bodies of this coal of any great economic value are found in Ohio.

USES OF OHIO COALS.

For a better understanding of the value of Ohio coals, it is deemed important that some remarks should be made as to the particular uses to which they may be put. Following the divisions as made by Dr. Orton, the most important uses for which certain of these coals are applicable are as follows:

1. Domestic or household use.
2. Steam production.
3. Blast furnace use.
4. Coke manufacture.
5. Rolling mill use.
6. Gas making.

Of course it will be understood that a coal that may in every way be suitable for one use may be

wholly inapplicable to another, so that it is very desirable for a coal railway to have a variety of coals for the various demands that may be made.

Coals for Domestic or Household Use.—For household use there is no fixed standard. Many different varieties from widely separated sections are equally esteemed. The rich cementing Pittsburgh coal has long supplied the Ohio and lower Mississippi Valleys; Cincinnati, Louisville, Memphis, Vicksburg and New Orleans being largely supplied with coal by river tows. In these valleys it continues to hold its ground against all competitors.

Steam Coal.—Likewise there can be said to be no particular coal used as steam coal, as coal from nearly every seam in the State is made to do duty in this capacity. The Upper Freeport is one of the very best steam coals in the State. This is largely due to its high per cent. of fixed carbon; while its softness is less against it in that use than in others. Commonly the obnoxious elements to be avoided in a good steam coal are large per cents. of ash and sulphur that accumulate, forming the clinker. However, there may be exceptions, as where the sulphur largely passes off with the volatile matter, or where with a coal of a high per cent. of ash, all that may be necessary is that the fire should be properly stoked.

Blast Furnace Use.—For blast furnace use, only the best and purest of the open burning coals are available in the raw state; but none of the coals along the road belong to this class.

Coking Coals.—But little coke is produced in Ohio, the total product in 1893 being less than 30,000 tons. The Lower and Upper Freeport and the Pitts-

burgh seams produce a coal better adapted to coke making than any other in the State.

Rolling Mill Coal.—For a good rolling mill coal the requisites are quick combustion with plenty of flame, together with as much purity as can be had. The Lower and Middle Kittanning, the Lower and Upper Freeport and the Pittsburgh coals all do service for this purpose.

Gas Making.—There are several seams that are used for gas making in the State. The Middle Kittanning and the Pittsburgh coals are probably more extensively used than any other for this purpose.

Thus it will be seen that there are found in the carboniferous measures along the line of the road, excellent coals for the principal uses to which the bituminous coals are put. By far the largest tonnage of the Ohio coals is consumed for household use and for steam production, and for these purposes the coals along the road are superior.

CHEMICAL ANALYSIS AND COMPOSITION OF OHIO COALS.

In the particular description of the various seams of coal along the line of the road, many chemical analyses are given, showing the composition of the coal. For the greater part these analyses, made by Prof. N. W. Lord, are taken from the later volumes of the Geological Survey.

The chemical analyses of coals are very valuable in their way, but are not an absolute indication at all as to the relative value of coals for given commercial purposes. A given coal may show a superior analysis to another, and yet be inferior to the latter as a fuel for certain uses, or possibly for any use. Thus a coal

may show a very high per cent. of sulphur, that in some cases largely passes off with the volatile matter, and in others combines with the ingredients of the ash forming clinkers. So the same coal that may not clinker or give any trouble in a grate will be found totally useless in very high temperatures, especially if the fire is not properly handled.

The analyses of coals here given are made by what is known as the "proximate" method, briefly dercribed as follows:

The sample is first weighed and then dried in a crucible, the loss in weight showing the amount of moisture. The sample is then heated till the volatile combustible matter is driven off,leaving the coke, which is further burned till nothing but the ash remains. The determination of the amount of sulphur is made independently. It may be readily seen that the relative amounts of volatile combustible matter and fixed carbon depend on the length of time and the degree to which the sample has been subjected to heat. It thus often happens that the same coal will give very different results as far as the volatile matter and fixed carbon are concerned, when the analyses are made by different chemists

Still, for practical purposes the so called proximate method is the best, though it is necessary to make due allowances when comparing the results of analyses of coal made by different chemists.

The analysis as given by the above method shows the determination of the following:

1st. Moisture.
2nd. Volatile combustible matter.
3rd. Fixed carbon.
4th. Ash.
5th. Sulphur.

Moisture.—The moisture is the water found in the coal. Water of course is not capable of combustion, and its presence is deleterious in two ways. First it is an inert weight added to the coal, and second it absolutely diminishes the effective available power of the fuel in the evaporation of the contained moisture. Therefore the relative amount of moisture that a given coal possesses is a very important factor in determining its available power. The amount of moisture contained in Ohio coals may be said to range from 1½ to 8½ per cent. In the Hocking Valley field it averages perhaps about 6 per cent. or more. In the coals along the Bellaire, Zanesville & Cincinnati Railway it ranges from less than 1½ to 5 per cent., the first being that of the Pittsburgh coal, and the latter that of the Kittanning coals. These coals are much better in this respect than are the coals from other districts in the State.

Volatile Combustible Matter.—As indicated above the volatile combustible matter comprises in a general way those constituents that pass off in a gaseous state. Under proper conditions of combustion it may furnish a large amount of calorific power, but otherwise is largely wasted in the forms of light invisible gasses, as well as in dense clouds of black smoke. Therefore in the use of any bituminous coal great care should be exercised in the proper handling of the fuel while undergoing combustion.

Fixed Carbon.—A comparatively high per cent. of fixed carbon is commonly regarded as a very desirable quality in a coal, as it is nearly all effective in the production of calorific power. However, the fixed carbon should not be too high and the volatile com-

bustible matter too low, for otherwise the coal will not kindle readily nor will it burn freely.

Ash.—The ash is a deleterious matter only in so far as it is an inert ingredient, that must be handled at more or less annoyance and expense. For steam purposes a coal with a high per cent. of ash will require the more stoking to allow a proper draft, besides the extra expense in the removal of the ashes. For locomotive use, a high proportion is commonly not so objectionable, owing to the ready means of disposing of the ash. The ash in Ohio coals ranges from 2 per cent. to as high as 20 per cent., the latter figures indicating a very hard bone coal. In the coals of Southeastern Ohio the ash ranges from 5 to 13 per cent.

Sulphur.—For some purposes and under some conditions the sulphur in a coal may not be a particularly objectionable ingredient, though commonly it is so to a more or less degree. For some purposes, such as for blast furnace use, even a moderately high per cent. renders a coal unfit for use. In other cases it combines with the ingredients of the ash, forming clinkers that are commonly very objectionable. Sometimes it largely passes off with the volatile combustible matter, in which case no particular harm results. Generally speaking, the deleterious effect of the sulphur in a coal can only be determined by a practical test in the particular use to which it is to be put. Sulphur is commonly found in coal as the sulphuret of iron, generally known as pyrite. As such it is found in coal under several well marked forms which we can not here stop to describe, other than to say that in some cases it is found in thick layers or large lenticular

masses, while again it may be in small particles disseminated through the coal. Where it occurs in large masses, much care should be exercised in the preparation of the product for the market, thereby greatly enhancing its value. In case the sulphur is disseminated through the coal in small particles, it can only be removed by washing or coking, and then perhaps only in an imperfect degree.

TOPOGRAPHY.

The region traversed by the Bellaire, Zanesville and Cincinnati Railway and its projected lines, is hilly as is all eastern and southern Ohio. The hills, however, are not the result of any uplift or disturbance of the strata, but were carved out by the innumerable streams from what was once a great elevated plain. They are but the remnants left after the removal of the enormous amounts of material in the formation of the valleys by such erosion. The streams that drain into the Ohio, have eroded deep valleys, often with rugged and precipitous sides. West of the basins of these streams, in the region drained by the waters of the Muskingum, the hills are neither so high nor so rugged as those farther east. However, the whole region is very favorable to the carrying on of mining operations on a large scale.

THE COAL TRADE.

The report closes with some remarks on the coal trade of the North and West, with reference to furnishing a demand for these coals. While an immense amount of bituminous coal is consumed within the borders of the State, it is this great coalless region,

with its vast and ever increasing population, to which we must largely look for a market.

METHOD OF DESCRIBING THE SEAMS.

With these introductory remarks we shall now proceed to describe the seams of coal tributary to the road, beginning with the lowest found geologically, the Lower Kittanning, and ending with the highest or the Meigs Creek coal.

II.

THE LOWER KITTANNING COAL.

Following the order just indicated in the Introduction, the first seam that is tributary to the road is the Lower Kittanning coal, or No. 5, this being the lowest seam, geologically speaking, that is reached in the region under consideration.

On the whole the Lower Kittanning is a very persistent seam, and one of the important ones of Ohio. The interval between the Lower Kittanning and the Middle Kittanning being but some 20 or 30 feet in the region of the best development, the boundaries of the one are practically coincident with those of the other, though the Lower is not so apt to be found of minable thickness, where due This coal mines small, is bright and well faced, having generally about 60 per cent of fixed carbon, 40 per cent. of volatile combustible matter, 4 to 5 per cent. of ash and over 2 per cent. of sulphur. A sample of the coal from the Mill Run mines, within a half mile of the Bellaire, Zanesville & Cincinnati Railway, shows the following analysis:

Analysis of Coal, Mill Run Mines.

Moisture	4 93
Volatile Combustible Matter	39.72
Fixed Carbon	49.96
Ash	5.39
Total	100.00
Sulphur	3.45

For comparison the following analysis is given from the seam in the Redfield district, Columbus, Shawnee & Hocking Railway:

Analysis of Coal, Redfield District.

Moisture	6.04
Volatile Combustible Matter	42.66
Fixed Carbon	45.55
Ash	5.75
Total	100.00
Sulphur	1.92

Likewise for comparison, the analysis of the coal from the Tunnel mines at Ironton is given, thus:

Analysis of Coal, Tunnel Mines.

Moisture	5.19
Volatile Combustible Matter	41.86
Fixed Carbon	47.69
Ash	5.26
Total	100.00
Sulphur	1.40

The Tunnel mines, as above, have furnished nearly all the coal for the manufacturing and domestic use at Ironton. It will be noted that the analysis of this coal is very similar to that of the Zanesville seam.

This coal, in the main, is an open burning white ash coal. It holds the fire well and is considered a strong and servicable coal, but does not ignite so well as the seam above. The coal is applied to all ordinary uses. It is a very good gas coal, and a superior coke is made from the coal in some districts of the State.

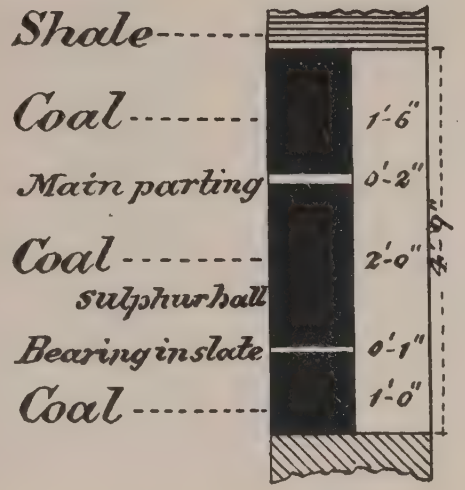
Along the line of the Bellaire, Zanesville & Cincinnati Railway it only appears above the drainage in

the neighborhood of Mill Run Shops. At the Mill Run mines the seam reaches a thickness of about 4 feet and 9 inches, and is considered a coal of excellent quality, especially as a milling coal.

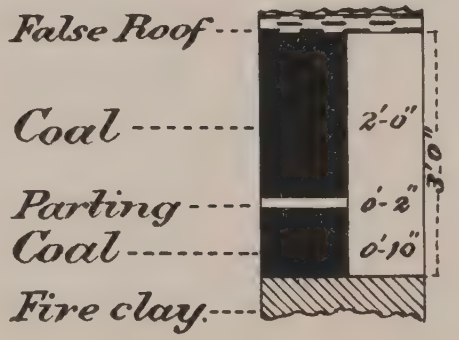
In the first figure of Plate 1, there is shown a section of this coal from the Harper mine in this locality. On the coal map accompanying this report, the Lower Kittanning is not shown. As before remarked, the boundaries of the two Kittanning coals are generally practically coincident, though to the south and east of the Mill Run basin, the coal appears to have been cut out by a heavy sandstone.

While the thickness of the seam at Zanesville is better than elsewhere in the State, the per cent. of sulphur is rather high, but this is not regarded as a detriment to the uses to which it is applied.

No. 5, or
Lower Kittanning Coal,
Harper's Mine,
Zanesville.



No. 6, or
Middle Kittanning Coal,
Harper's Mine,
Zanesville.



No. 6, or
Middle Kittanning Coal,
Jones' Mine,
McLuney.

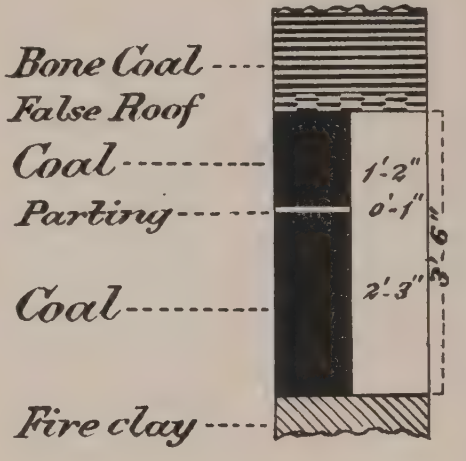


PLATE I.
SECTIONS,
KITTANNING COALS

A. Hoen & Co. Lith. Baltimore.

III.

THE MIDDLE KITTANNING COAL.

The Middle Kittanning Coal—No. 6—is one of the three most important seams of coal in the State, the other two being the Upper Freeport and the Pittsburgh. The seam now under consideration is widely distributed over the State, and its quality is everywhere superior. This coal, locally known as the Upper Zanesville coal, lies from 20 to 30 feet above the Lower Kittanning seam in Muskingum county, and is the same coal as the "Great Vein" of the Hocking Valley.

Generally speaking of the Ohio basins, the coal is moderately cementing, burning with a bright flame, rather high in sulphur, but low in ash, the latter being almost invariably of a chocolate red color. The fixed carbon never quite reaches 50 per cent., and the volatile matter never falls below 40 per cent. A short distance west of the Muskingum River the coal changes to a typically open burning coal, with a white ash.

The coal from this seam is largely used for gas making, it furnishing a few years ago at least three-fourths of all the coal for this purpose in the State. It averages about 3¾ feet of gas to the pound, though in many instances it does much better than this. The coke is a favorite for base burning stoves, though for cupola or blast furnace use it is not equal to the Connellsville coke of Pennsylvania.

This coal is quite extensively mined at Zanesville and vicinity, and furnishes a considerable portion of the local supply.

The composition of this coal in the Zanesville district is shown by the following analysis of a sample from the Coal Dale mines just east of the city:

Analysis of Coal, Coal Dale Mines.

Moisture	4.82
Volatile Combustible Matter	40.91
Fixed Carbon	48.67
Ash	5.60
Total	100.00
Sulphur	3.57

This is about an average of this coal in eastern Ohio.

For comparison, the following analysis is given of the coal from the extensive Pike Run mine No. 1, on the Cleveland, Lorain & Wheeling Railway:

Analysis of Coal, Pike Run Mine, No. 1.

Moisture	2.98
Volatile Combustible Matter	43.82
Fixed Carbon	45.82
Ash	7.38
Total	100.00
Sulphur	3.24.

For further comparison, the following analysis is given of the coal taken from the seam in Perry county, from the extensive Jones mine, at McLuney on the Cincinnati & Muskingum Valley Railway:

Analysis of Coal, Jones' Mine.

Moisture	5.95
Volatile Combustible Matter	41.87
Fixed Carbon	48.21
Ash	3.97
Total	100.00
Sulphur	1.65

The coal at this mine is 3½ feet thick, and commonly costs about five cents per ton more to mine than the thick seam to the southward.

The seam in some places in the State reaches a thickness of 5 feet, or even much more, as in the Hocking Valley district, though the average thickness is about 3½ feet.

In the Zanesville district the minable coal of the seam averages about 30 to 40 inches. The structure of the coal in this district is shown in the second figure of Plate I, in the section from Harper's mine, in the outskirts of Zanesville. For comparison, a section is given of the coal at the Jones mine, at McLuney, Perry county.

Along the line of the Bellaire, Zanesville & Cincinnati Railway the only mines opened in this coal are in the immediate neighborhood of Zanesville; none of them extending further east than the Fisher mine, about 3½ miles east of the city. South and east of the Fisher mine the coal becomes too low for drainage. At Romine, 5½ miles east of Zanesville, the seam is about 50 feet beneath the surface, as shown by recent borings. The coal could probably be reached by shafts of moderate depth for several miles further east. A drill hole put down at Chandlersville, 13½ miles east of Zanesville, showed the seam there to be 3 feet and

4 inches thick, being found 157 feet beneath the surface. In the vicinity of Belle Valley and Caldwell the seam is found, by drill holes, at a depth of about 275 feet, with a reported thickness of 3½ feet to 6 feet.

The coal map herewith, only indicates the presence of the seam in the Zanesville district. Too little is known of the seam further east to warrant any attempt at mapping it at present.

IV.

THE UPPER FREEPORT COAL.

The Upper Freeport coal—No. 7—is commonly regarded as the uppermost seam of the Lower Coal Measures. According to Dr. Orton, State Geologist, the coal is the second one of importance in the State, so far as production is concerned.

As will be seen by an inspection of the coal map, accompanying this report, a large portion of the so-called Southwest basin of this seam is tributary to the line of the Bellaire, Zanesville & Cincinnati Railway and its proposed "Cut-off Line," being much larger in fact than the portion of the field now so extensively mined near Cambridge, on the Cleveland & Marietta and the Baltimore and Ohio railroads. The boundaries of this basin of the Upper Freeport are not well defined, being largely below drainage. The seam does not appear to have had a marginal origin as was evidently the case with the Kittanning coals but its horizon seems to have covered a wide area, only to be determined by further exploration. The map shows the limit only so far as present investigations would warrant, or so far as affecting the future traffic of the Bellaire, Zanesville & Cincinnati Railway and its projected lines.

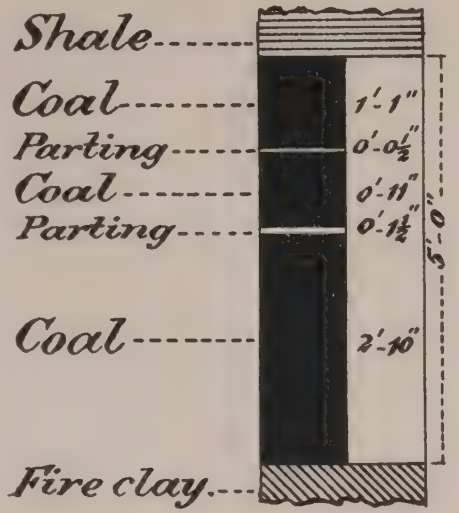
While the horizon of the seam covers a wide extent of territory, the coal was never originally well distributed like the Middle Kittanning coal, being

quite irregular as to thickness and distribution. Where the coal is originally wanting, the horizon can commonly be traced by the presence of characteristic strata. But even in the basins where the coal was deposited to a normal thickness of 5 or 6 feet, we find many "wants" and "horsebacks," caused by the erosion of channels in the top of the seam, the place of the coal being taken by the massive Mahoning sandstone. In these basins, while seldom wanting altogether, it is often reduced from full thickness to a few inches in a distance of a few yards. Therefore while the map shows the seam as covering a wide extent of territory, tributary to the line, much further exploration in the way of careful drilling is necessary to fully determine the value of the field. But notwithstanding all these faults, the seam is a very valuable one.

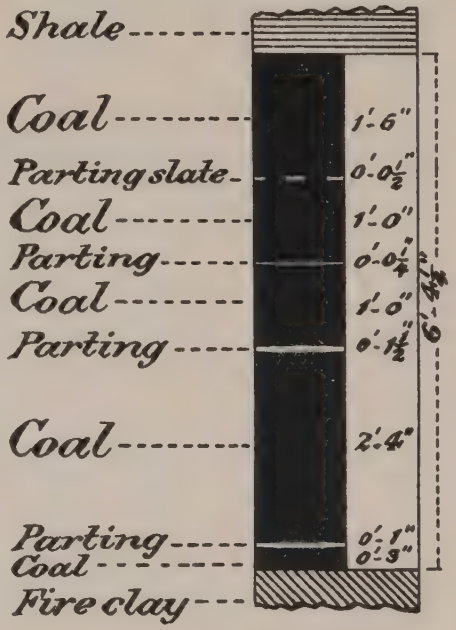
In Muskingum county the seam lies about 130 feet above the Middle Kittanning coal. The coal is found along the National Turnpike, two miles east of Zanesville, where the seam is from 3 to 5½ feet in thickness. Along the line of the Bellaire, Zanesville & Cincinnati Railway it is only mined at Romine mine, 5½ miles east of Zanesville, where the seam is from 6 to 7 feet thick, well located for mining and of excellent quality. Two mines are opened at this point, shipping coal in standard gauge cars. By the construction of short spurs, a considerable amount of this coal could be reached in this locality.

Local banks are now open in this seam along Big Salt Creek, 10 miles east of Zanesville, where the seam is reported 4 to 5 feet thick. The seam is not seen above drainage along the road east of this point.

N. E. 1-4 Sec. 12, Wayne Tp., Muskingum County.



S. W. 1-4 Sec. 10, Wayne Tp., Muskingum County.



Diamond Mine, Romine Station.

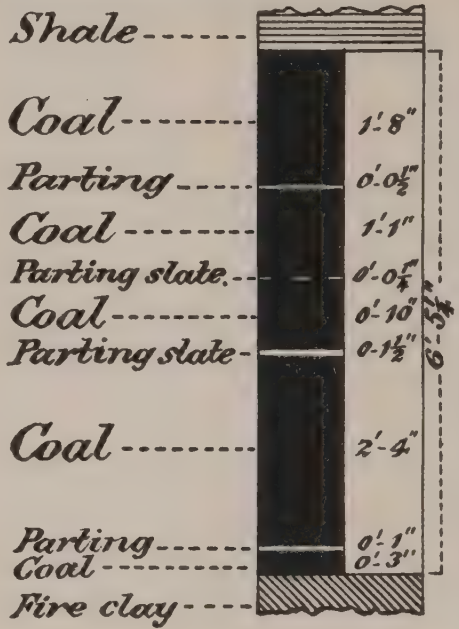


PLATE II
SECTIONS
NO. 7, OR UPPER FREEPORT COAL

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Explorations show that the coal underlies a large part of the Eastern Ohio Railroad, on the proposed "Cut-off Line", a large mine being in operation at Hartford. There are also two large mines in operation at Point Pleasant, where the "Cut-off Line" crosses the Cleveland & Marietta Railway. Throughout this section the seam is commonly 6 feet thick.

Generally speaking, the Upper Freeport seam is a moderately cementing coal, well jointed, rather soft and without excessive ash or sulphur. It commonly contains from 50 to 55 per cent. fixed carbon, and always less than 40 per cent. volatile combustible matter. Aside from the sulphur it makes a good coke. For general steam purposes it is superior.

As showing the composition of this seam in its best phases, the following analysis is given of the coal from the Hartford mine, Eastern Ohio Railroad, on the proposed "Cut-off Line":

Analysis of Coal, Hartford Mine.

Moisture	3.97
Volatile Combustible Matter	34.78
Fixed Carbon	56.32
Ash	4.93
Total	100.00
Sulphur	.79

This analysis shows a much better coal than the average of this seam throughout the State. The seam in this mine is 6 feet thick and is regarded as being of a superior quality.

For comparison, the following analysis is given of the coal from the Nicholson mine, in the noted Cambridge district, on the Cleveland & Marietta Railway:

Analysis of Coal, Nicholson Mine.

Moisture	3.84
Volatile Combustible Matter	37.90
Fixed Carbon	53.83
Ash	4.43
Total	100.00
Sulphur	1.38

Dr. Orton, State Geologist, speaking of this analysis of the Nicholson mine coal, says that "it is apparent that such figures mark one of the finest coals of the State. The physical qualities of strength and hardness alone are lacking to make this the peer of any Ohio coal." However, it will be seen that the coal does not show so good an analysis as the coal from the Hartford mine first above given.

The structure of the coal is well shown in Plates II and III. From the sections here given it will be seen that the seam in the Romine district, while thicker, is more split up by partings, requiring somewhat more attention on the part of the miner in preparing the product for the market.

Recent drill holes near Belle Valley and Caldwell show that the seam may be reached in this locality at moderate depths. At Belle Valley this coal was found to be about 170 feet beneath the surface, and at Caldwell some 40 or 50 feet deeper. These borings show that where not cut out, the coal has a normal thickness of about 6 feet.

While the lack of the coal in physical strength is against it as a coal for lake transportation, it is one of the best coals in the State as a steam coal, largely due to its high per cent. of fixed carbon. Its superior quality for this use is becoming better established every year.

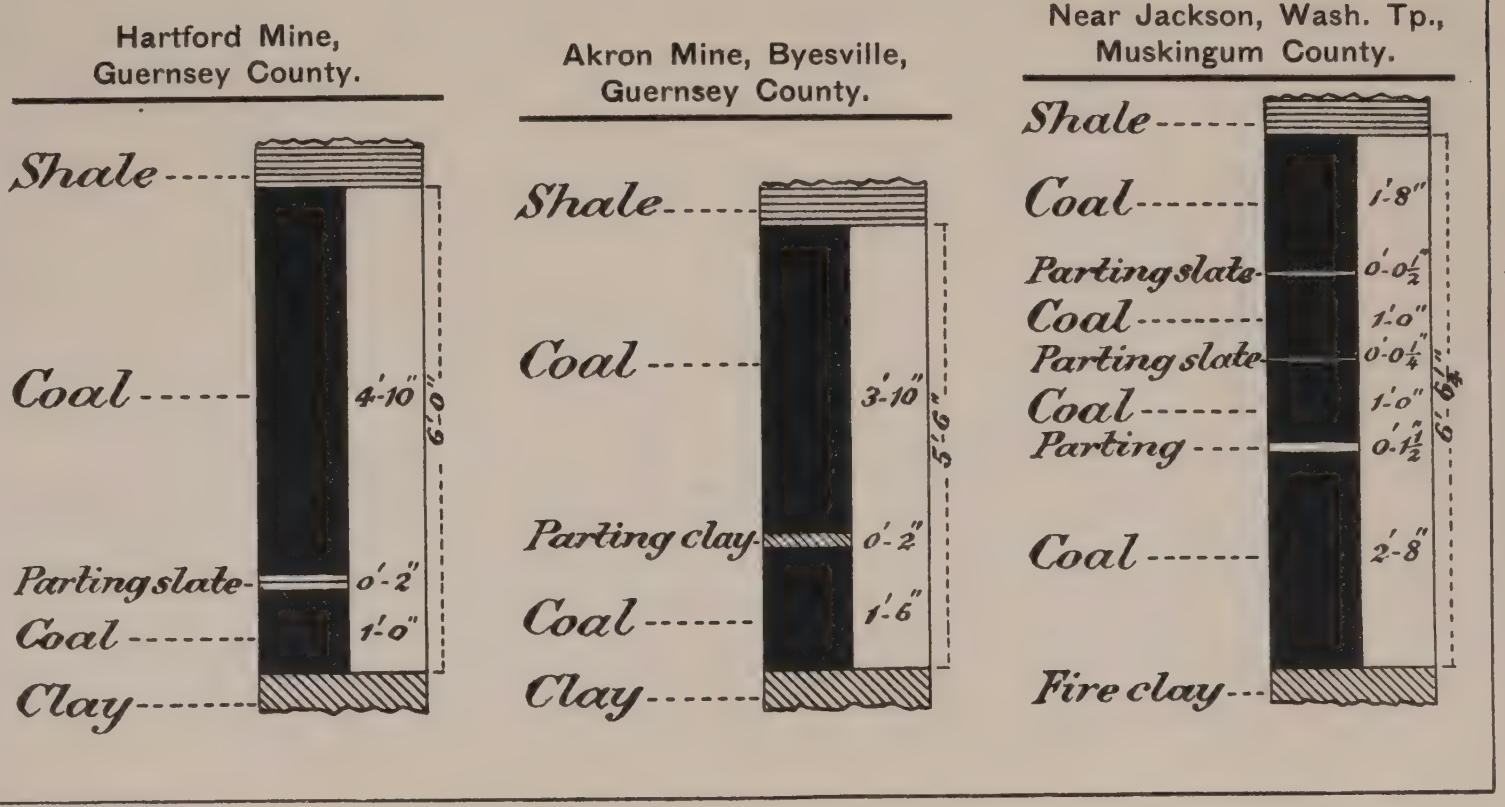

PLATE III,
SECTIONS.
NO.7, OR UPPER FREEPORT COAL.

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V.

THE PITTSBURGH COAL.

The most important seam of coal along the line of the road, so far as a superior coal for general utility may be concerned, is known in the eastern part of the State as the Pittsburgh coal, and in the southern part of the State as the Pomeroy coal. This coal is also known as the No. 8, and forms the base of the Upper Coal Measures.

Prof. Newberry and Dr. Orton, two leading authorities on American geology, concur in regarding this as the leading seam of the great Appalachian coal field. In speaking of this coal the former says it is "on the whole the most extensive and economically important coal bed in the Allegheny coal field," while the latter, in the last volume of the Ohio Geological Survey says, that "the Pittsburgh coal is unquestionably and by all odds the most valuable single coal seam of the great Appalachian field." While the development of the seam is more extensive east of the Ohio River, there is a very large field west of the river, as will be seen by an inspection of the coal map accompanying the report, which shows in general the outline of the field, so far as present explorations warrant.

The general line of the dip is to the south and east, so that in the northern portion of the Ohio field, the seam lies high in the hills, and consequently a

large portion of the coal has been eroded, while in the southern portion of the field it is largely below drainage. The part of this district traversed by the Bellaire, Zanesville & Cincinnati Railway and its projected lines, while below drainage, is intersected by numerous streams, up which branch lines may be constructed for the convenient location of mines. Along Captina Creek and its branches from the north, the coal rises almost as fast as the bed of the streams, so that at any point in these valleys the coal may be reached at moderate depths. Along the valleys of some of the branches from the south side also, the coal is not far beneath the surface. Thus—as more particularly indicated further on—it is seen that the Bellaire, Zanesville & Cincinnati Railway, with its projected lines, reaches the best portion of this field west of the Ohio River.

To show the great economic value of this coal, it may be remarked that it is the principal coal seam worked at Pittsburgh, on the Youghiogheny and Monongahela rivers, at Connellsville, Wheeling and other important points. West of the Ohio River the coal is extensively mined in the counties of Jefferson, Harrison and Belmont. From the points above named immense quantities of this coal are shipped by river tows to all important points in the Lower Ohio and Mississippi valleys, and as before remarked, it holds its own against all competitors. From the Ohio field it is largely shipped by the Cleveland & Pittsburgh, the Wheeling & Lake Erie, the Cleveland, Lorain & Wheeling, and the Baltimore & Ohio railroads.

Generally speaking, throughout eastern Ohio the coal is remarkable for its regularity in quality, thick-

ness, structure and freedom from "wants," clay seams and "horsebacks." There are usually two or three very thin partings, the minable coal commonly being about 5½ feet thick. There is a coal from one to three feet thick, of poor quality, above the main coal and separated from it by about a foot of clay. As soon as the main coal is mined, the clay comes down, and the upper coal is then commonly left for a roof. The structure of the coal is well shown in Plates IV and V. All the sections shown on the plates are from localities tributary to the Bellaire, Zanesville & Cincinnati Railway and its projected lines, except, for comparison, that of the coal from the very extensive Wheeling Creek mines near Bridgeport, on the Cleveland, Lorain & Wheeling Railway. The coal is bright, well jointed, well faced and highly cementing, and is hard enough to bear well the handling incident to transportation. It has a moderate amount of ash, is rather high in sulphur, contains about 50 per cent. of fixed carbon and 37 to 40 per cent. of volatile matter.

The coal is mostly used for household fuel, steam generation and in the manufacture of glass, pottery and iron. But little is used for furnace coke or for smelting iron. It is highly regarded as a fuel for locomotives, for which perhaps it has no superior.

Some years since the Detroit, Grand Haven & Milwaukee and the Grand Trunk railways jointly made some exhaustive practical tests in connection with furnishing these roads with coal for locomotive use. The result showed the relative value of the coal tested to be as follows, the Tuscarawas coal being taken as a standard:

"Tuscarawas" coal	100.00
Wheeling Creek coal	99.72
Cambridge [B. & O.] coal	93.96
Toledo & Ohio Central coal	89.02
Hocking Valley coal	88.34
Hinckley-Streator, Illinois, coal	86.55
Grape Creek coal	80.10
Park Co. coal	79.69
Streator coal	74.62
Wilmington coal	74.34

The Pittsburgh coal as above shows but a fourth of one per cent. less value than the Tuscarawas, a coal of most excellent reputation. The supply of the Tuscarawas, however, is comparatively limited and can never compete in a large way with the thick and widely distributed Pittsburgh seam.

The coal is largely mined in Pultney township, Belmont county, in which township Bellaire is situated. The seam is here locally known as the Bellaire coal. Along the line of the Bellaire, Zanesville & Cincinnati Railway, in this township, there are three large mines open: two owned by Mr. Jacob Heatherington, the Belmont mine and the Glass House mine; and a third by Mr. Rockershousen, known as the Pittsburgh Coal Works. The minable coal at these mines is about 5 to 6 feet, averaging perhaps 5½ feet. In the northern part of the township the coal is considerably above the level of the river, but owing to the rapid local dip to the south and east, in South Bellaire the seam is about on a level with the bed of the river, and is reached in the above named mines by slopes.

The structure of this coal may be seen from the second figure in Plate V., which shows a section of the

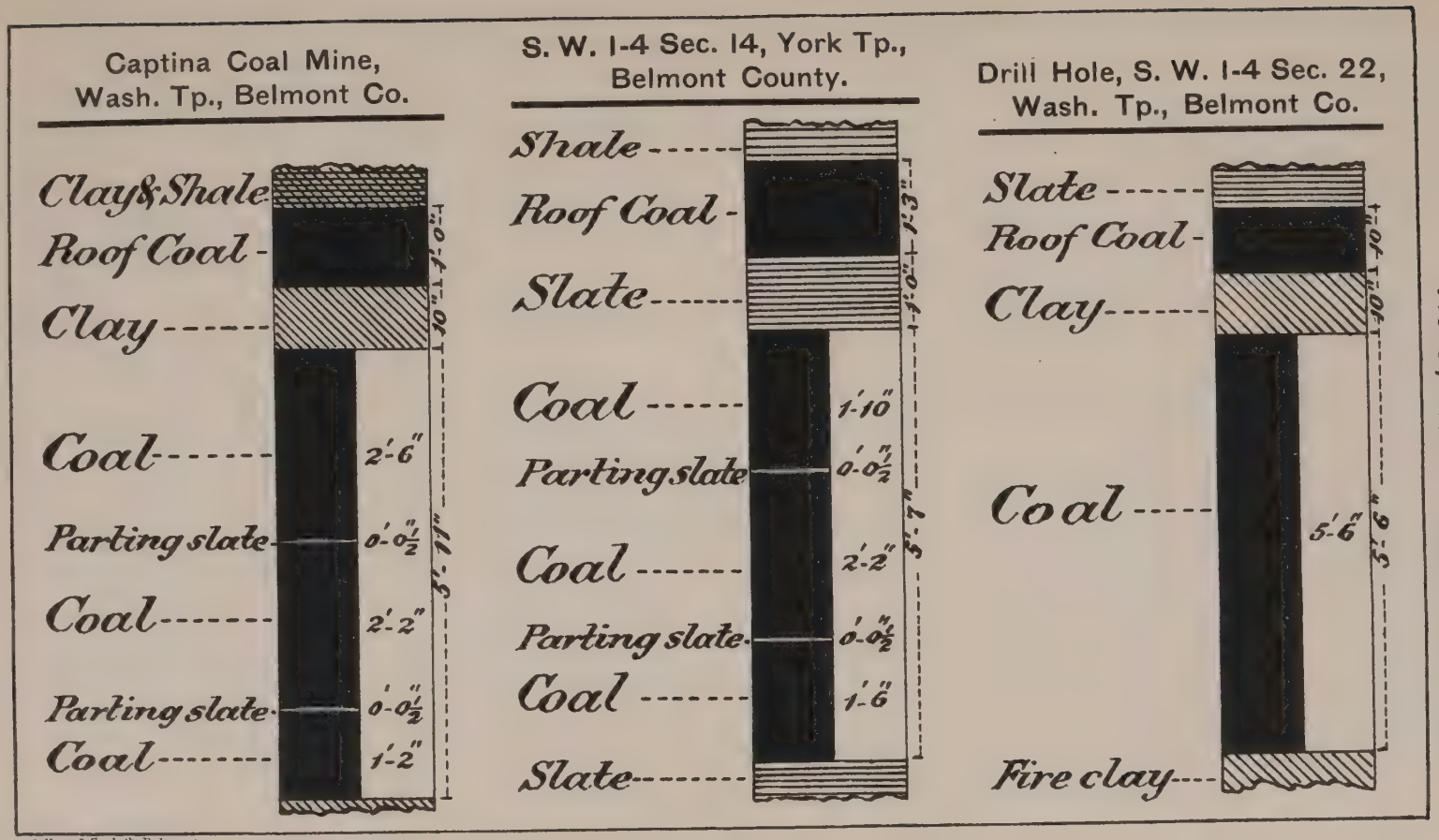

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PLATE IV
SECTIONS
NO. 8, OR PITTSBURGH COAL.

coal at the Pittsburgh Coal Works. The composition of the coal from these works is shown by the following analysis:

Analysis of Coal, Pittsburgh Coal Works.

Moisture	1.52
Volatile Combustible Matter	41.70
Fixed Carbon	48.69
Ash	8.09
Total	100.00
Sulphur	4.98

Mead township lies immediately south of Pultney, the northern boundary lying about 2½ miles south of Bellaire. The coal is mined at several points along the river, but is not mined along the line of the road in this township. However, the whole of this township is underlaid by this seam, and could be reached along our line on Wegee Creek for some miles at moderate depths.

The railway passes through the southeast corner of Smith township, which is wholly underlaid by the coal. As the road runs along the high ridges in this township, the coal would, of necessity, have to be reached by short branch lines along the valleys of the streams tributary to Captina Creek to the south.

The line of the road next passes into Washington township, running diagonally through the township from the northeast corner to the southwest corner. The whole of the township is underlaid by the seam. It is only mined in the township at Captina Station, 19 miles west of Bellaire, by the Captina Coal Company. The coal at this point is reached by a shaft 74

feet deep from the surface of the ground to the bottom of the coal. The coal is here commonly 6 feet thick. The structure of the coal in this mine is shown in the first figure in Plate IV. The roof coal here, as elsewhere, is commonly left for a roof and is considered a very good and safe one. Some little fire damp is found, but not enough to interfere much with mining operations Enough crude petroleum is found seeping out of the coal roof to supply the mine cars and machinery. The quality of the coal is shown by the following analysis:

Analysis of Coal, Captina Coal Works.

Moisture	1.55
Volatile Combustible Matter	42.47
Fixed Carbon	47.70
Ash	8.28
Total	100.00
Sulphur	5.14

For comparison the following analysis is given of the coal from the extensive Wheeling Creek mines on the Cleveland, Lorain & Wheeling Railway:

Analysis of Coal, Wheeling Creek Mines.

Moisture	1.74
Volatile Combustible Matter	41.39
Fixed Carbon	48.90
Ash	7.97
Total	100.00
Sulphur	4.12

The coal is found all along Captina Creek between Captina Station and the Ohio River, the seam being found some feet beneath the bed of the stream

at its mouth. Some four miles below Captina Station the seam appears above the surface, seeming to indicate the presence of a low anticlinal. A considerable amount of coal is here mined for local use, the coal maintaining its character as to quality and thickness. The structure of the coal is indicated by the second figure in Plate IV, from a local mine in the S. W. ¼ Sec. 14, York township.

A short time since, the writer secured a diamond drill with the services of an experienced operator to make some explorations as to the thickness and location of this coal along Captina Creek and its tributaries. The first drill hole was put down at Alledonia, in the S. W. ¼ Sec. 22 of Washington township, where the projected "Cut-off Line" leaves the present operated line. The coal was here reached at a depth of 136½ feet, measuring to the bottom of the seam. The coal of the main seam was here found to be 5 feet and 6 inches thick. The structure may be seen by the last figure in Plate IV, the partings being omitted owing to difficulty in exactly locating them.

The second drill hole was put down in the S. W. ¼ Sec. 10, Wayne township, at the intersection of Captina Creek and the North Fork. The coal was here found at a depth of 105 feet, measuring from the bottom of the seam. The seam was here found to be 5 feet and 7 inches thick. The structure is shown in the first cut in Plate V.

The third hole was put down at Somerton, in the north half of Sec. 2, Somerset township, where the coal was found to be 4 feet and 7 inches thick, at a depth of 163 feet. A fourth hole was put down near the summit, between the head waters of Captina and

Wills creeks, in the N. W. ¼ Sec. 21, Somerset township. The coal was found to be 4 feet and 2 inches thick, the depth of the hole being 212 feet.

West of the summit just described, the valley of Wills Creek is much lower than that of Captina Creek, so that the coal outcrops in the hill side a few feet above the stream at Temperanceville. The coal is here mined quite extensively for local use. The coal at this point is from 4 to 5 feet thick, probably averaging about 4 feet and 4 inches.

An analysis of the coal from this point, made by the Pittsburgh Testing Laboratory shows the following composition:

Analysis of Coal, Temperanceville Mines.

Moisture	1.38
Volatile Combustible Matter	41.30
Fixed Carbon	48.16
Ash	9.16
Total	100.00
Sulphur	5.41

The analysis shows the composition to be but little different from that of the coal at the Captina Coal Works.

Owing to the fall of the creek and the dip being in opposite directions, the coal is soon found in the tops of the hills, to the west of Temperanceville. But little or no coal of commercial value is found west of the Belmont county line.

To test the territory lying north of Captina Creek, three additional holes were drilled, two on the North Fork of Captina Creek, and one on the Bend Fork. The first hole on the North Fork was in the

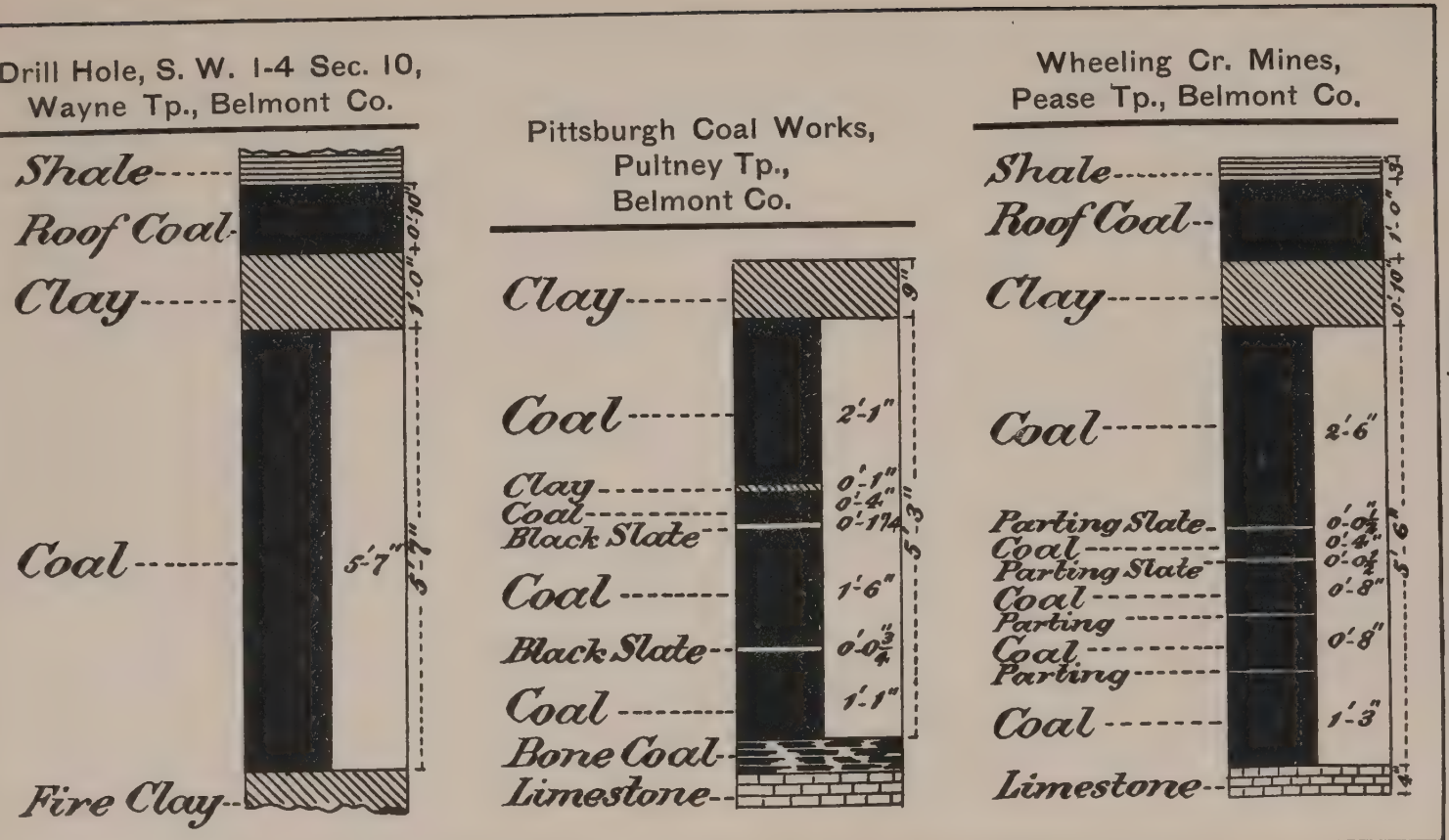

PLATE V.
SECTIONS.
NO. 8, OR PITTSBURGH COAL.

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N. W. ¼ Sec. 23, Wayne township, and the second in the S. E. ¼ Sec. 31, Goshen township. In both these holes the coal was only about 2½ feet thick, the top of the coal being cut out by a heavy sandstone. Further explorations may show some minable coal along this branch. The third hole was drilled at Hatcher's Mill, on Bend Fork, in the N. W. ¼ Sec. 1, Goshen township. The coal was here found at a depth of 188 feet, the main seam being 5 feet and 1 inch thick. The strata overlying the coal were found to be normal, showing no disturbance, as on the North Fork to the west.

Leaving Alledonia, on the present operated line, the road ascends the valley of Crabapple Creek, along which the coal may be reached at moderate depths for a few miles.

South of Captina Creek comparatively little is known of the coal. On Peavine Creek, a tributary of Captina Creek on the south, a recent oil well drilled in the S. E. ¼ Sec. 9, some three miles southeast of Alledonia, showed the existence of the seam in normal thickness at a depth of about 100 feet. Within recent years a large number of oil wells have been drilled in southern Belmont county, and in the central and eastern portions of Monroe county, where the drillers report finding the coal of full thickness. It is believed that coal of minable thickness may be found to exist at least as far to the southwest as is indicated on the map accompanying this report, though further explorations are necessary to determine the value of this section.

However, enough is already known of this field to warrant the conclusion that the Bellaire, Zanesville &

Cincinnati Railway, with its projected lines, traverses by far the most extensive and best portion of this great field west of the Ohio River. Many square miles of coal within easy reach and at moderate depths are alone tributary to this road and its projected lines, the nature of the country being such as to forbid the building of rival lines into the territory, except at ruinous cost.

VI.

THE MEIGS CREEK COAL.

The remaining coal that we have to consider is known as the Meigs Creek coal or No. 9, and is the equivalent of the Sewickley coal of Pennsylvania. Throughout the southeastern part of Muskingum county, the eastern part of Morgan, the whole of Noble, and the northwestern part of Washington county, it is the most important seam of coal found.

The seam is commonly about 4 feet thick, though in many localities, over considerable areas, it reaches a thickness of 4½ to 5 feet. The general character of the coal is very regular over the entire field, though varying greatly as to purity.

An average of many analyses shows about the following as the composition of this coal:

Analysis of Coal, Average of Many Samples.

Moisture	3.00
Volatile Combustible Matter	41.00
Fixed Carbon	45 00
Ash	11.00
Total	100.00
Sulphur	5.00

However, in many localities the per cent. of ash and sulphur is not so high as here shown. As a rule the coal mines well, and is hard enough to bear the

necessary handling to distant markets. However, as a commercial coal, less is known of it than the other seams under consideration, owing to the fact that the central and best portions of the seam are distant from any railroad.

The coal has been quite extensively mined at Coal Run, on the Muskingum River, where it has been used for domestic and steam purposes, and is here considered an excellent coal.

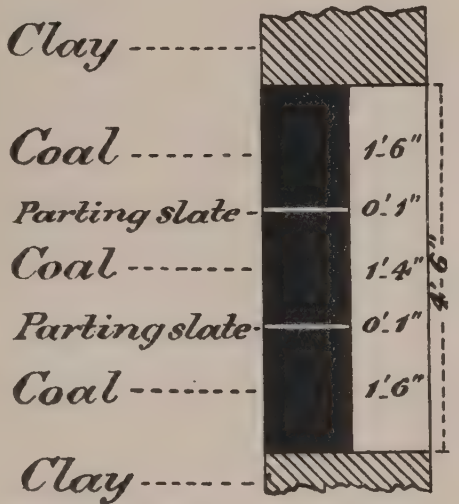
Some 6 or 7 miles south of Cumberland in the N. W. ¼ Sec. 31, Brookfield township, Noble county, this coal has been used at Dickinson's Mill for a great many years, where it is regarded as a superior steam coal. Its structure at this place is shown in the second figure in Plate VI.

The Bellaire, Zanesville & Cincinnati and the Baltimore & Ohio railroads have within the last few years made some tests of this coal as a locomotive fuel, and so far as tried, the coal makes an excellent showing as a steam coal. Prof. Andrews, for a number of years Assistant Geologist of the State Geological Survey, in speaking of this coal says: "The coal, when mined with proper care, is of good quality for the generation of steam and for household use. It has a caking tendency and needs stoking to allow proper draft." Elsewhere he says: "The coal readily kindles, burns freely, with a brilliant flame and has a high heating power."

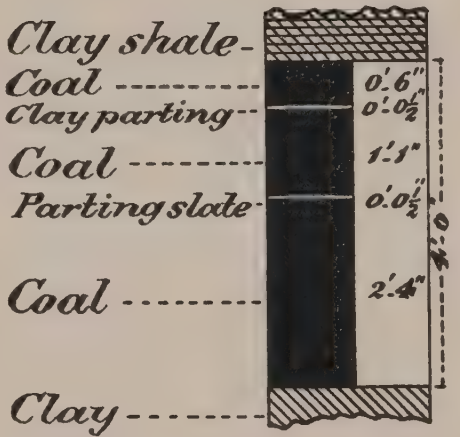
The central portion of the basin southwest of Cumberland and west of Belle Valley, is said to have the best coal of this seam. While the sulphur and ash are quite high, the freedom of the latter from iron seems to render the coal comparatively free from

PLATE VI.
SECTIONS.
NO. 9, OR MEIGS CREEK COAL

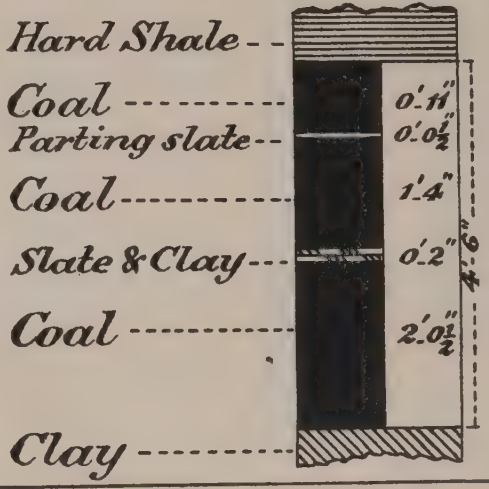
N. E. 1-4 Sec. 9, Meigs Tp., Muskingum Co.



N. W. 1-4 Section 31, Brookfield Tp., Noble Co.



S. W. 1-4 Section 4, Brookfield Tp., Noble Co.



A Hoen & Co Lith Baltimore.

forming clinkers, a very objectionable feature in many coals

Owing to the high per cent. of ash, the fire needs stoking to secure proper results in the generation of steam. As Prof. Thorpe in "Coal—Its History and Uses," well remarks, "the amount of heat that is extracted from any particular coal depends as much upon the skill of the stoker, and the construction of the furnace as upon the absolute calorific power of the fuel."

Along the line of the road the coal first appears on the west end at the portals of St. Clair tunnel, 18 miles east of Zanesville, where it is mined for local use. At Cumberland, 23 miles east of Zanesville, the coal is pretty extensively mined for local use. The coal skirts along in the hills along the road for some 5 or 6 miles east of Cumberland, when the coal is found wanting, owing to the erosion of Duck Creek and its tributaries. In order to reach the heart of the field in the neighborhood of Cumberland, it is proposed to build a branch line some 5 or 6 miles long, in a southwesterly direction, up one of the tributaries of Wills Creek, where are found favorable localities for mining in a large way. The structure of the coal in this district is well shown in Plates VI and VII.

As showing the composition of the coal from this district, the following analysis, by Langenbeck, is given of this coal from the S. E. ¼ Sec 10, Meigs township, Muskingum county:

Analysis of Coal, from Section 10, *Meigs Township.*

Moisture	2.11
Volatile Combustible Matter	46.77
Fixed Carbon	43.26
Ash	7.86
Total	100.00
Sulphur	5.98

An average of three samples of coal from the McClelland bank in Sec. 24 Meigs township, shows the following analysis by Fisher:

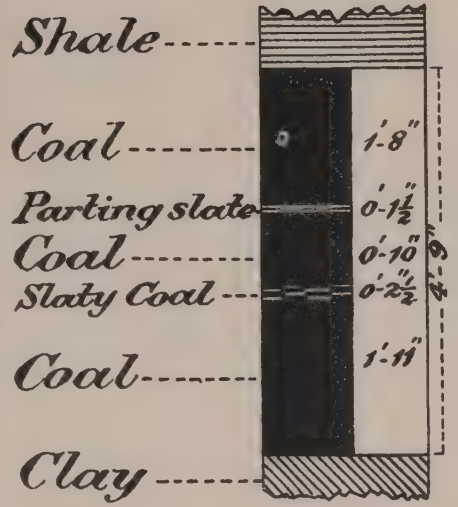
Analysis of Coal, McClelland Bank.

Moisture	2.59
Volatile Combustible Matter	42.95
Fixed Carbon	44.77
Ash	9.67
Total	99.98
Sulphur	4.61

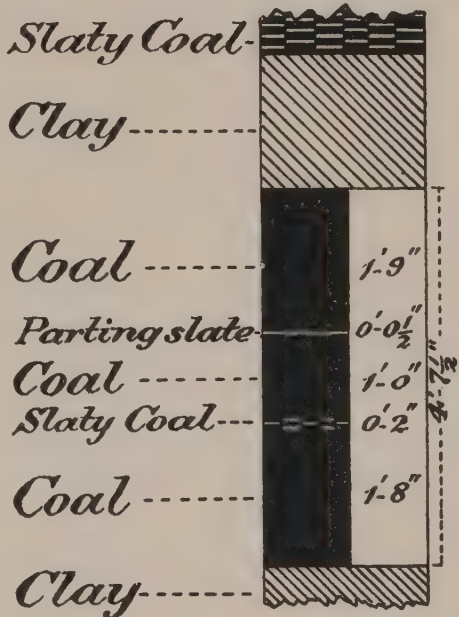
There is quite an extensive basin of this coal lying east of Duck Creek, that is tributary to the line of the road. At some points in this basin the seam has a reported thickness of 5 feet or more, of a good quality. The coal appears on the east end of the road in considerable force, but seems to be of an inferior quality. It is here commonly found some 80 or 90 feet above the Pittsburgh coal.

As already indicated, it would appear that the most promising district, so far as this coal is concerned, is that lying southwest of Cumberland and west of Belle Valley, covering a territory that extends to the hills skirting the Muskingum River, some 15 or 20 miles distant. In this extensive tract the coal lies low

N. W. 1-4 Sec. 26, Meigs Tp., Muskingum County.



S. E. 1-4 Sec. 10, Meigs Tp., Muskingum County.



S. W. 1-4 Sec. 11, Meigs Tp., Muskingum County.

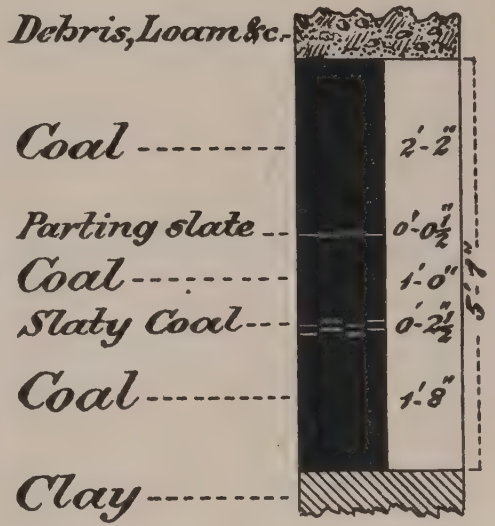


PLATE VII
SECTIONS.
NO. 9 OR MEIGS CREEK COAL

A. Hoen & Co. Lith. Baltimore

in the hills, so that no considerable portion has been eroded by the streams, and the seam is from 4 to 5 feet thick.

The coal map with this report shows pretty accurately the territory occupied by the coal of commercial value that is tributary to the road and its projected lines. It may be remarked however, that as a rule the coal in the outliers shown is of little value except for local use, commonly being quite impure. From an inspection of the map it will be readily seen that the main bodies of this seam are admirably located for mining on an extensive scale, the valleys giving ready access for the construction of switches or branch lines.

VII.

VALUE OF THE SOUTH EASTERN OHIO COALS, IN RELATION TO THE TRADE OF THE NORTH AND WEST.

CONCLUSION.

From the preceeding description of the coal seams of South Eastern Ohio, it may be readily seen that there is practically an inexhaustible supply of coal that is tributary to the Bellaire, Zanesville & Cincinnati Railway and its projected lines. It is also seen that in a commercial way the quality of these coals is equal, if not superior, to any in the state. It now remains to be seen whether or not the relation of these coals to the markets of the North and West is such that they can be profitably mined and delivered in these markets in competition with the various coals with which they are now supplied.

Accompanying this report is a railroad map, showing the relation of this coal region to these markets. From an inspection of this map, it will be readily seen that the railway facilities for reaching the practically coalless districts of the North and West are unsurpassed.

On the east end, at Bellaire, the road connects with the Pennsylvania Lines, the Cleveland, Lorain & Wheeling, and the Baltimore & Ohio railways, and can readily secure connection with the Wheeling & Lake Erie Railway. At Point Pleasant the Cut-off Line

PLATE VIII

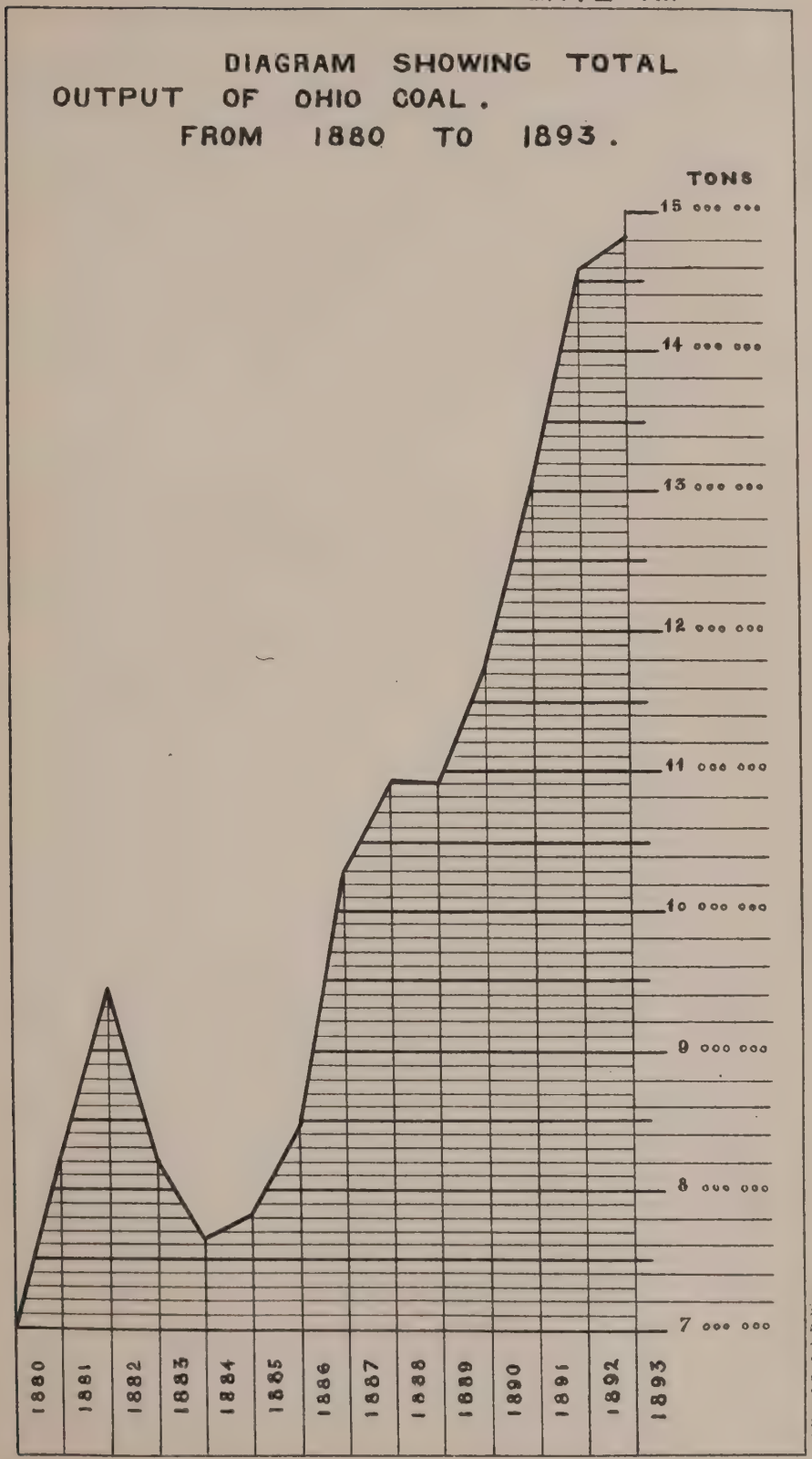


DIAGRAM SHOWING TOTAL
OUTPUT OF OHIO COAL.
FROM 1880 TO 1893.
TONS
15 000 000
14 000 000
13 000 000
12 000 000
11 000 000
10 000 000
9 000 000
8 000 000
7 000 000
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
A. Hoen & Co. Lith. Baltimore.

crosses the Cleveland & Marietta Railway, one of the Pennsylvania Lines, and by means of the lines of this corporation a direct route is had to Cleveland and Toledo.

On the west end, at Zanesville, the railway facilities are superior. Here connection is made with the Cleveland, Canton & Southern and the Cleveland, Akron & Columbus railroads for Cleveland and connecting lake lines. By the Pennsylvania Lines direct connection is made with Toledo and Chicago and lines diverging. By the Columbus, Shawnee & Hocking, direct communication is had with Sandusky and steamer lines diverging. By the Baltimore & Ohio Railroad we also reach Sandusky, as well as Chicago and lines diverging. Besides, all these lines cross the various railways leading to the great commercial centers of the West and Northwest.

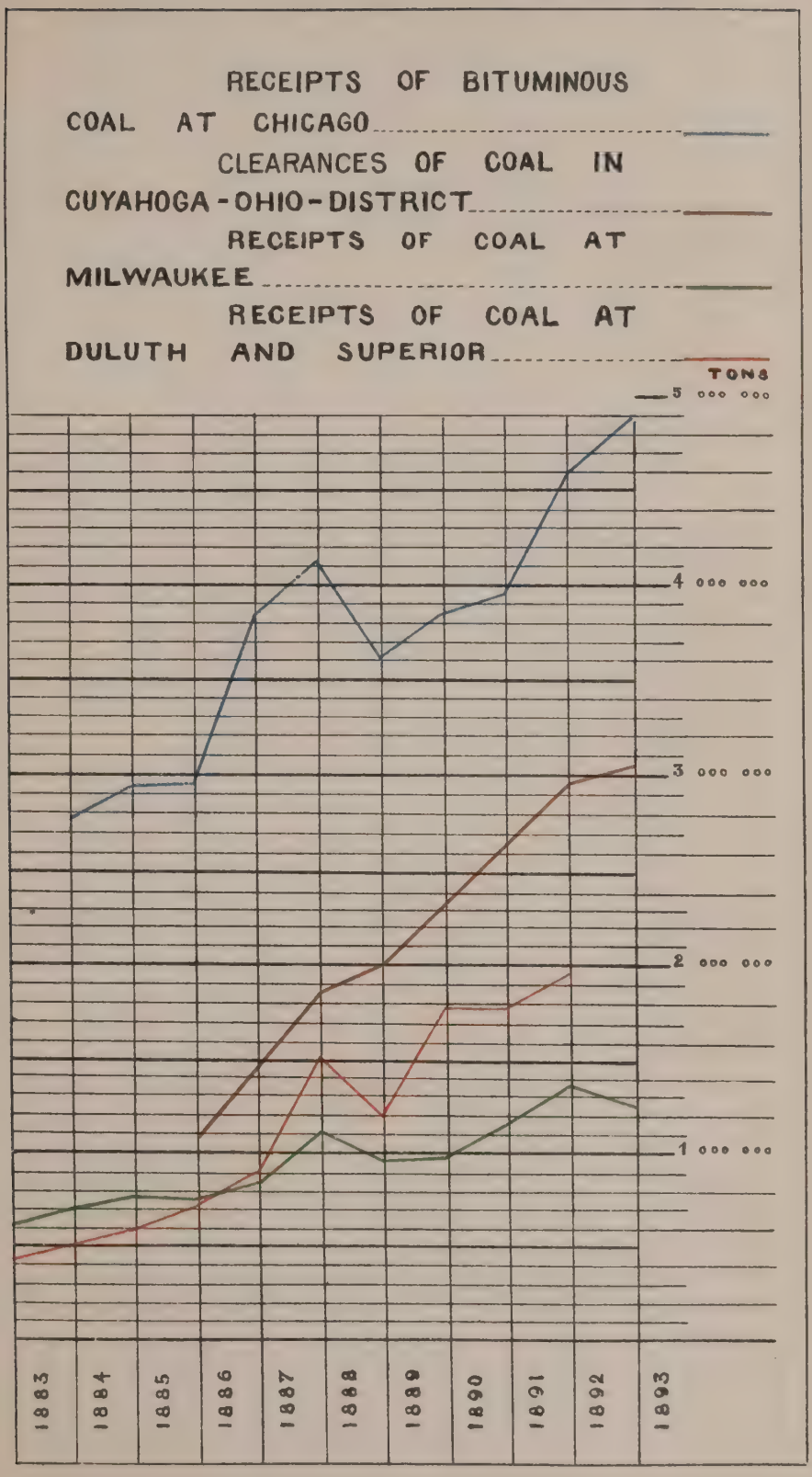
These routes compare favorably as to distance with the lines from the other mining districts of this region, or from the Hocking Valley, the Pomeroy or the Jackson districts, while the distance is much shorter than can be had from any of the West Virginia fields.

While the coals from the mining districts of Indiana, Illinois and Iowa are much nearer the market, the poor quality more than counterbalances the difference in distance. There is no coal anywhere west of the Ohio field that will at all compare with our coal in quality, the block coal in Indiana alone excepted. The quality of these western coals may be inferred from the following taken from Macfarlane's "Coal Regions of America:" "It is indeed but too evident that as compared with the coal produced in almost any other part of the Allegheny coal field, that of Illinois is very

inferior. Its disadvantages are its feeble heating power, the extraordinary quantity of sulphuret of iron it contains, and the large amount of ashes, soot and smoke produced. Its impurities render it necessary that it should be used very soon after it is mined, as in a few days it falls to pieces; being very friable, it does not bear transportation, and no considerable quantity can be kept together as it is liable to spontaneous combustion" When we take such facts as these into consideration, it is small wonder that the Ohio coals are constantly growing in the estimation of the consumers in the vast coalless regions of the West and Northwest.

In 1880 the total output of Ohio coals was in round numbers 7,000,000 tons. In 1893 it was almost 15,000,000 tons, or more than double. The average increase in output during this period has exceeded 600,000 tons per annum. The increase in the output of Ohio coals is well shown in Plate VIII, which, as well as the one following, was prepared for this report from information from the most reliable statistics at hand, principally from the several annual numbers of Day's "Mineral Resources of the United States." Anyone who will take the trouble to consider the wonderful increase in the output of Ohio coals, and the very rapid increase in the population of the Northwest, can but come to the conclusion that the market for Ohio coals must continue to absorb continually increasing amounts. It is not the purpose here to tire the patience of the reader with long columns of statistics showing the rapid increase in the consumption of coal in this region. But as indicating the continually increasing demand, the attention

PLATE IX


RECEIPTS OF BITUMINOUS COAL AT CHICAGO
CLEARANCES OF COAL IN CUYAHOGA-OHIO-DISTRICT
RECEIPTS OF COAL AT MILWAUKEE
RECEIPTS OF COAL AT DULUTH AND SUPERIOR
TONS
5 000 000
4 000 000
3 000 000
2 000 000
1 000 000
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893

is directed to Plate IX, showing the total receipts of coal at Chicago and Milwaukee, and also at the adjacent cities of Superior and Duluth. To indicate that the increase in the demand is shared by the Ohio coals, the plate also shows the clearances of coal for a period of eight years from the Cuyahoga district, which includes the Lake ports of Cleveland, Ashtabula, Fairport and Lorain. While periods of depression may temporarily restrict the output, there can be no doubt as to a continuance on the whole of the enormous increase in the product of the Ohio mines.

But granted the increase in the total product of the Ohio mines, it may be asked what chance the coals from a newly developed field would have in competition with the Ohio coals now on the market. As before indicated, the region under consideration has coal from three of the leading seams of Ohio. Of one of these, the Pittsburgh, or No. 8, the line has tributary to it by far a larger area than that possessed by any other road in the State. It is a well known fact that outside of the virgin fields along the line of this road, practically all the available coal lands in the other districts have been bought up. With even the present rate of consumption, the mining in a large way in these districts must soon begin to wane, and taking into account the increasing demands as well, it is evident that there must be an abundant demand for the coals of this region just as soon as they can be put on the market.

Taking into consideration the quality of the coals, the accessibility for mining purposes, the advantageous facilities offered for reaching the markets, and the very favorable terms on which the coal may

be had, it would certainly seem that the field is one offering superior inducements. With the railway developments completed, the property must necessarily become more valuable day by day. The rapid increase in the value of the coal lands in the old established districts of the State is well known. The demand for these lands and the consequent value, has the more rapidly increased since the working out of the coal in a large way has made itself so manifest in recent years. As a consequence, the coal in the new field must necessarily the more rapidly rise in value. In fact, it is only a question of limited time when the section under consideration, must become the leading mining region of Ohio.

RAIL ROAD MAP

Showing the relation of the

COAL FIELD of SOUTH EASTERN OHIO

to the Markets of the North and West

to accompany a Report by

JAS. K. GEDDES C.E.

1895.

SCALE OF MILES

0 5 10 15 20

LEGEND.

RAILWAY LINES.

- Bellaire, Zanesville & Cincinnati
- Baltimore & Ohio
- Pennsylvania Lines
- Columbus, Sandusky & Hocking
- Cleveland, Akron & Columbus
- Cleveland, Canton & Southern
- Cleveland, Lorain & Wheeling
- Wheeling & Lake Erie
- Toledo & Ohio Central
- Columbus, Hocking Valley & Toledo
- Flint & Pere Marquette
- Toledo, Ann Arbor & North Michigan
- Michigan Central
- Grand Trunk of Canada
- Lake Shore & Michigan Southern
- Other Lines

LAKE MICHIGAN

MICHIGAN

LAKE ST. CLAIR

LAKE ERIE

CANADA

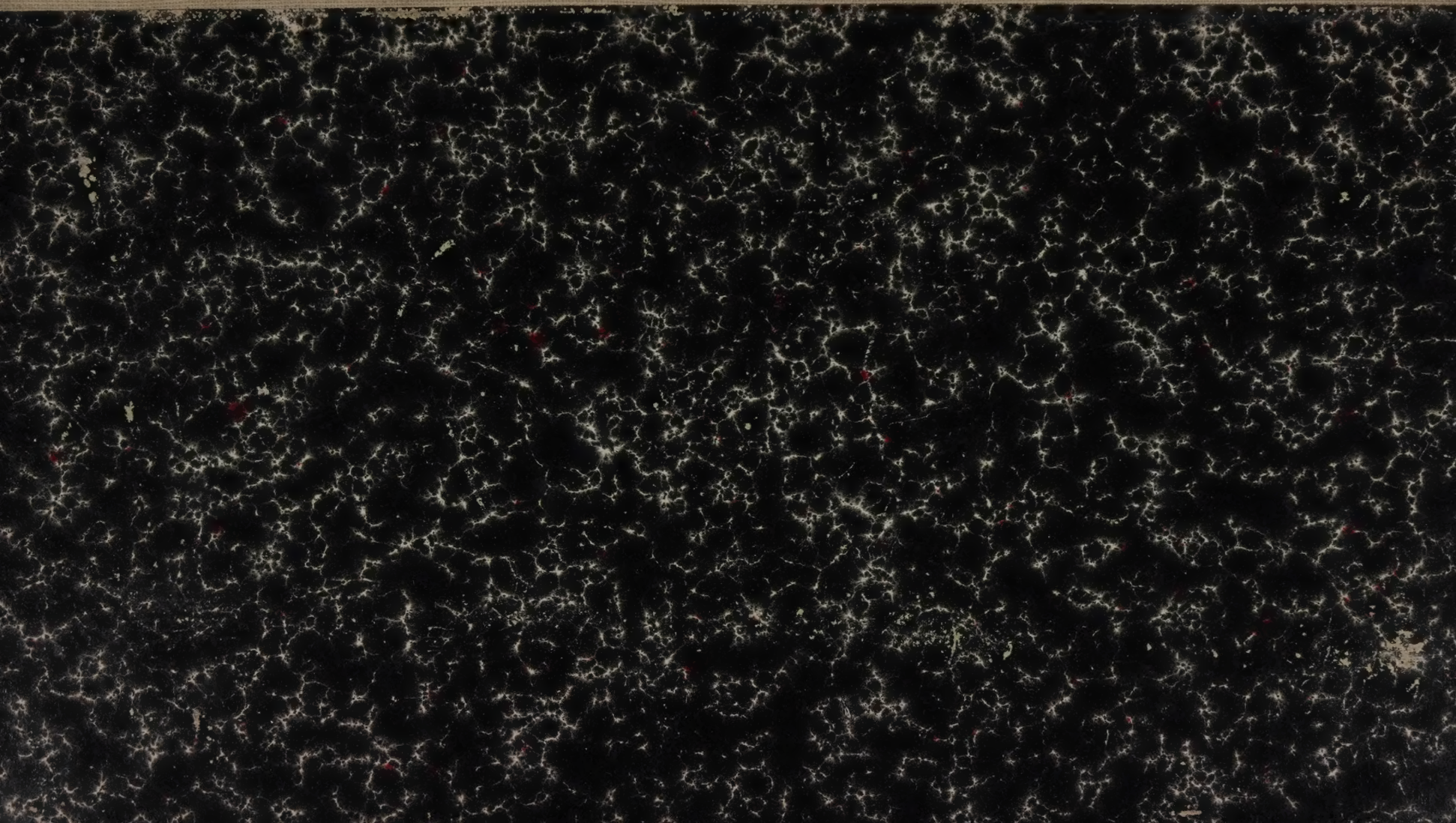
INDIANA

OHIO

KENTUCKY

PENNSYLVANIA

Chicago · Milwaukee · Detroit · Toledo · Cleveland · Columbus · Cincinnati · Indianapolis · Zanesville · Wheeling · Pittsburgh

Photo-Lith. by A. HOEN & CO., Balto., Md.

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